snake-plantains of New England; Brainerd, Saniculas of western Vermont; Collins, Notes on algæ, 1; Deane, A prolific gentian; Williams, Myosotis collina in New England; Robinson, A new wild lettuce (*L. Morssii*) from Massachusetts; Webster, Notes on some fleshy fungi found near Boston; Manning, Matricaria discoidea in eastern Massachusetts.

The Gametophyte of Botrychium virginianum.[1]—Until this publication of Mr. Jeffrey our knowledge of the development of the embryo of Botrychium was practically none, and the previous accounts of the prothallus have been very insufficient. The material used in his investigation was gathered in its natural habitat — a sphagnum bog in which he found an abundance of prothalli in all stages. Owing to the extreme delicacy of the objects, great difficulty was experienced in mining them into paraffin. An ingenious dialyzer rotated by clock-work was employed to insure the more gradual yet sufficiently rapid osmosis between the benzole and the alcohol.

The gametophyte of *B. virginianum* is subterranean and without chlorophyll, and harbors a fungus of a phycomycetous type which the author regards as possibly symbiotic with the prothallus. On the gametophyte, which is oval in shape and beset with rhizoids, are borne both the antheridia and archegonia. The former above the latter on the sides. The antheridia, which develop from a single superficial cell, possess a double outer wall like those of other Ophioglossaceæ known, and the antherozoids are of the usual type of the Filicineæ. The archegonium is somewhat less elaborate than that of the typical fern, and it is to be noticed that the canal cell while binucleate does not show any division of its protoplast. In the development of the egg-cell the usual divisions forming the octants are seen, but the walls of the latter soon lose their identity and the embryo is relatively many-celled before the organs appear. The root, shoot, and cotyledon originate from the upper part of the embryo — *i.e.*, probably the upper octants. The cotyledon is apparently a secondary formation in the region of the shoot. The foot which is large arises from the whole lower portion of the embryo. The growing region of the root, shoot, and cotyledon is in each case a single apical cell. The root develops most rapidly at first, followed by the cotyledon, a reversal of the condition found in *Ophioglossum pedunc-*

[1] Jeffrey, E. C. The Gametophyte of Botrychium virginianum, *Trans. Canad. Inst.* (1896–97). Reprinted for University of Toronto Studies (1898), *Biol. Series*, No. 1.

losum. But in other respects the gametophyte and embryo of *B. virginianum* agrees with what is known of other Ophioglossaceæ. The author points out a similarity in form between the prothalli of *B. virginianum* and *Hycopodium annotinum*, while a likeness is also found in the same organs of *Ophioglossum pedunculosum* and *L. cernuuem* and *L. inundatum*, showing two types of the gametophyte in the Ophioglossaceæ as in the Lycopodineæ.

H. M. R.

Proteolytic Enzyme of Nepenthes.[1]—This paper is in continuation of one published by the same author in 1897. He concludes that the enzyme from the pitchers of Nepenthes is comparatively a very stable one. High temperatures and alkalis gradually lessen its activity, but do not completely destroy its power of digestion unless strong means are employed. The enzyme is of the nature of a tryptic ferment closely resembling that found in germinating seeds, like which it is active only in an acid medium. The author considers that he has fairly demonstrated the enzyme to arise from a zymogen in the gland cell of the pitcher.

H. M. R.

Nucleus of the Yeast Plant.[2]—According to this last account the cells of yeast certainly possess what the author terms a nuclear apparatus. This consists in the early stages of fermentation of what is called a homogeneous nucleolus in close contact with a vacuole containing a chromatin network. In later stages the "chromatin-vacuole" may have disappeared, the chromatin material being found as fine granules in the protoplasm. In the young stages there may be more than one "chromatin-vacuole," which later appear to fuse. The division which accompanies budding is direct, and takes place in the constriction between mother and daughter cell. If the author is properly understood, in spore formation the chromatin is absorbed by the nucleolus, to appear later in the form of fine grains (chromosomes?). The nucleolus elongates into a dumb-bell shape in the division preceding spore formation, and then constricts into two. Subsequent divisions forming four or even more new nucleoli may take place. A wall forms around these, and the spores are formed. The author does not demonstrate very definitely the relation of the nuclear apparatus of the spore to that of the vegetative cell. It

[1] Vines, S. H. The Proteolytic Enzyme of Nepenthes (II), *Ann. Bot.*, vol. xii (December, 1898), pp. 545–555.

[2] Wager, Harold. The Nucleus of the Yeast Plant, *Ann. Bot.*, vol. xii (December, 1898), pp. 499–537, Pls. XXIX, XXX.